Abstract Submitted
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Ion acoustic wave collapse via two-ion wave decay: 2D Vlasov simulation and theory[1] THOMAS CHAPMAN, RICHARD BERGER, Lawrence Livermore National Laboratory, JEFFREY BANKS, Rensselaer Polytechnic Institute, STEPHAN BRUNNER, Ecole Polytechnique Federale de Lausanne — The decay of ion acoustic waves (IAWs) via two-ion wave decay may transfer energy from the electric field of the IAWs to the particles, resulting in a significant heating of resonant particles. This process has previously been shown in numerical simulations to decrease the plasma reflectivity due to stimulated Brillouin scattering. Two-ion wave decay is a fundamental property of ion acoustic waves that occurs over most if not all of the parameter space of relevance to inertial confinement fusion experiments, and can lead to a sudden collapse of IAWs. The treatment of all species kinetically, and in particular the electrons, is required to describe the decay process correctly. We present fully kinetic 2D+2V Vlasov simulations of IAWs undergoing decay to a highly nonlinear turbulent state using the code LOKI. The scaling of the decay rate with characteristic plasma parameters and wave amplitude is shown. A new theory describing two-ion wave decay in 2D, that incorporates key kinetic properties of the electrons, is presented and used to explain quantitatively for the first time the observed decay of IAWs.

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